A Special Fire Plan for the Santee Experimental Forest

by
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FOREWORD

This plan marks a milestone in the protection of small but high-value forest tracts from fire. It clearly focuses attention on the appraisal of values, their degree of fire tolerance, and the specific measures needed to safeguard investments. The philosophies, concepts, and methods illustrated, have wide application. From these we gain an appreciation of the need for full-time initial attack forces during periods of danger. This need remains constant even though the modern trend in protection is toward large-scale operations.

The searching look at destructible values, and the information on time, kind, and source of fire that affect each value-class area are unique in fire planning. Fine balance is achieved between degree of fuel control needed and strength of supplemental fire suppression forces. This plan provides protection adequate to meet all but the most extreme fire conditions.

Intimate knowledge of this forest, possible only on small areas, has led to the refinement of planning achieved here.

The forest landowner will find this an excellent guide for making provision to insure his investment. Regardless of his location in relation to the protection resources of the regular responsible agency, he must provide for two exigencies: (1) The period from origin of fire to arrival of organized crews, and (2) that dreaded situation when all regular protection forces are fully engaged elsewhere. A close study of this paper will help prepare for both situations.

The personnel of the Southeastern Forest Experiment Station deserve commendation for producing this plan.

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Plots and long-term studies on experimental forests have special need for fire protection. As the years go by and the investment increases, the greatest danger is that forest fire may burn up study plots representing many years of work — values that cannot be replaced. The threat is always there, and despite the unending vigilance of a small forest staff, protection at present is often inadequate.

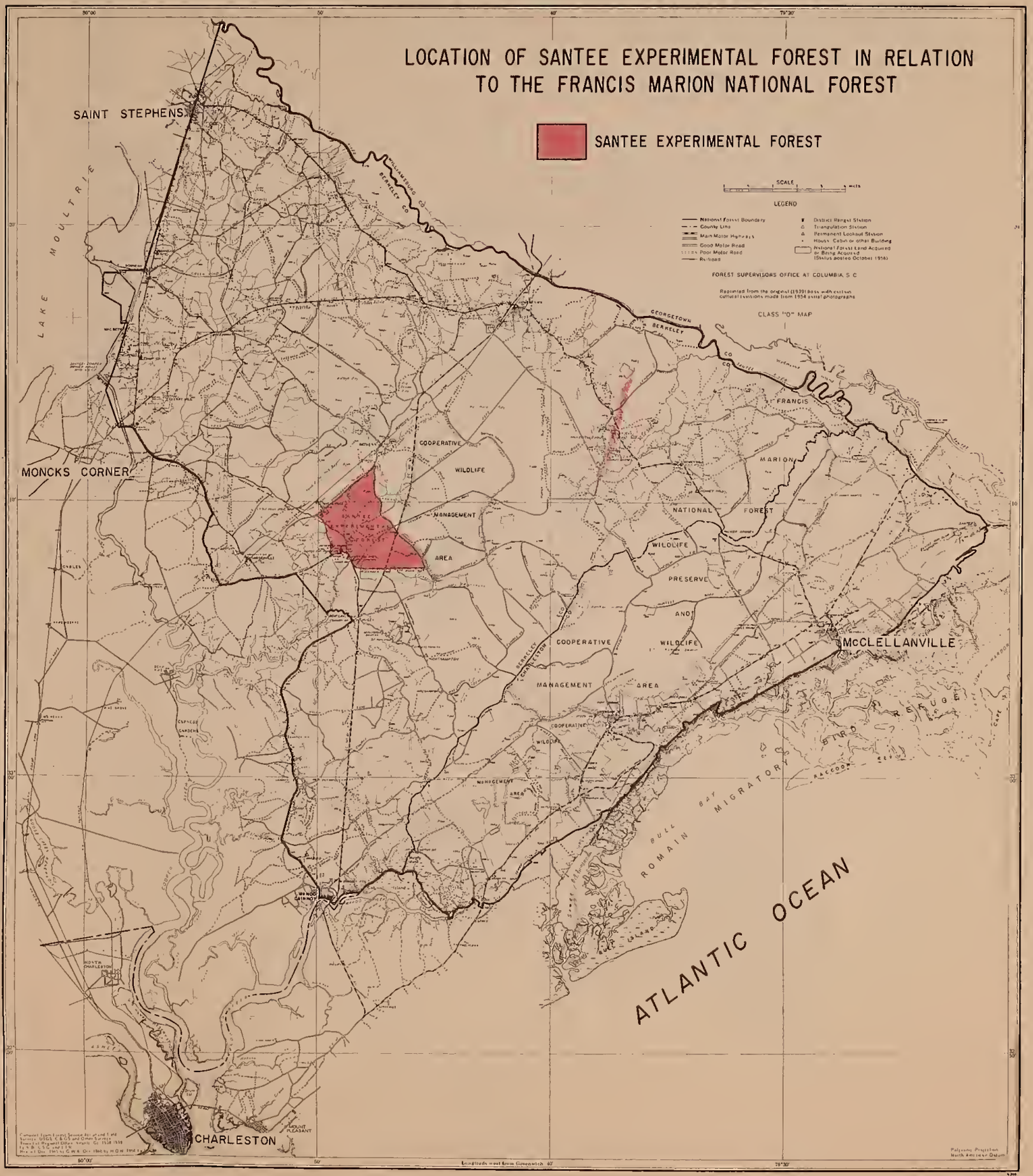
To cope with this danger from fire loss, we have investigated past causes, locations, and timing of fires in and around the Santee Experimental Forest (fig. 1) near Charleston, South Carolina, and designed a special fire plan aimed at maximum protection. Routine protection is provided at present by the Witherbee Ranger District of the Francis Marion National Forest. Because the National Forest fire control forces are overextended during emergency periods, and because of the values at stake, this protection is considered inadequate.

Fire-line plow ready to roll, on a Francis Marion fire.

Values at stake are difficult to assess. On the 6,100-acre Santee we have 2,800 acres of loblolly pine, 2,500 acres of bottomland hardwoods, 800 acres of longleaf — a typical forest of the coastal plain flatwoods. Timber value of some $1,200,000 develops from a growing stock of 34 million board feet of pine and 15 million board feet of hardwoods. The investment includes $60,000 in headquarters improvements, and about $350,000 in the establishment cost of research installations (fig. 2). More important are the intangibles—the study values that will be realized 20 years hence, and the 14 years that have already gone into research plots. If a fire wipes this out, no amount of money can replace the years lost.

Broad outlines of this special plan may serve other men charged with protecting small forest areas that are particularly valuable.

Figure 1. — Location of Santee Experimental Forest in relation to Francis Marion National Forest.


LOCATION OF SANTEE EXPERIMENTAL FOREST IN RELATION TO THE FRANCIS MARION NATIONAL FOREST
SANTEE EXPERIMENTAL FOREST
SAINT STEPHENS
MONCKS CORNER
CHARLESTON
McCLELLANVILLE
ATLANTIC OCEAN
LAKE MOULTRIE
BERKELEY CO
GEORGETOWN
COOPERATIVE
WILDLIFE
MANAGEMENT
AREA
FRANCIS
MARION
NATIONAL
FOREST
WILDLIFE
PRESERVE
COOPERATIVE
WILDLIFE
MANAGEMENT
AREA
COOPERATIVE
WILDLIFE
MANAGEMENT
AREA
BULL
ROMAIN
BAY
MIGRATORY
BIRD
REFUGE
SCALE
LEGEND
National Forest Boundary
County Line
Main Motor Highways
Good Motor Road
Poor Motor Road
Railroad
District Ranger Station
Triangulation Station
Permanent Lookout Station
House, Cabin or other Building
National Forest Land Acquired or Being Acquired (Status posted October 1958)
FOREST SUPERVISORS OFFICE AT COLUMBIA, S C
Reprinted from the original (1939) base with cultural revisions made from 1954 aerial photographs
CLASS "D" MAP

LEGEND FOR MAPS

- MAIN MOTOR ROAD—PAVED
- MAIN MOTOR ROAD—GRADED
- GOOD MOTOR ROAD
- POOR MOTOR ROAD
- WOODS ROAD
- CLASS A CORNER
- TRACT CORNER
- PRIVATE TRACT
- BUILDING
- RECREATION AREA
- LIMIT OF PROTECTION AREA
- EXPERIMENTAL FOREST BOUNDARY
- COMPARTMENT NUMBER
- HARDWOOD CONTROL BLOCK
- GROWING SPACE PLOT
- FARM WOODLOT
- BOTTOMLAND HARDWOOD CUTTING AREAS H1 & H2
- S—11 PLOTS, HARDWOOD PLANTING
- EXPERIMENTAL HARDWOOD PLANTATIONS
- SLASH PINE PROVENANCE TEST
- SUMMER BURN PLOT
- S—16 NURSERY SELECTION PLOT
- CUTTING METHODS PLOT—LOBLOLLY PULPWOOD STAND

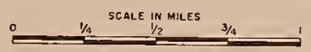
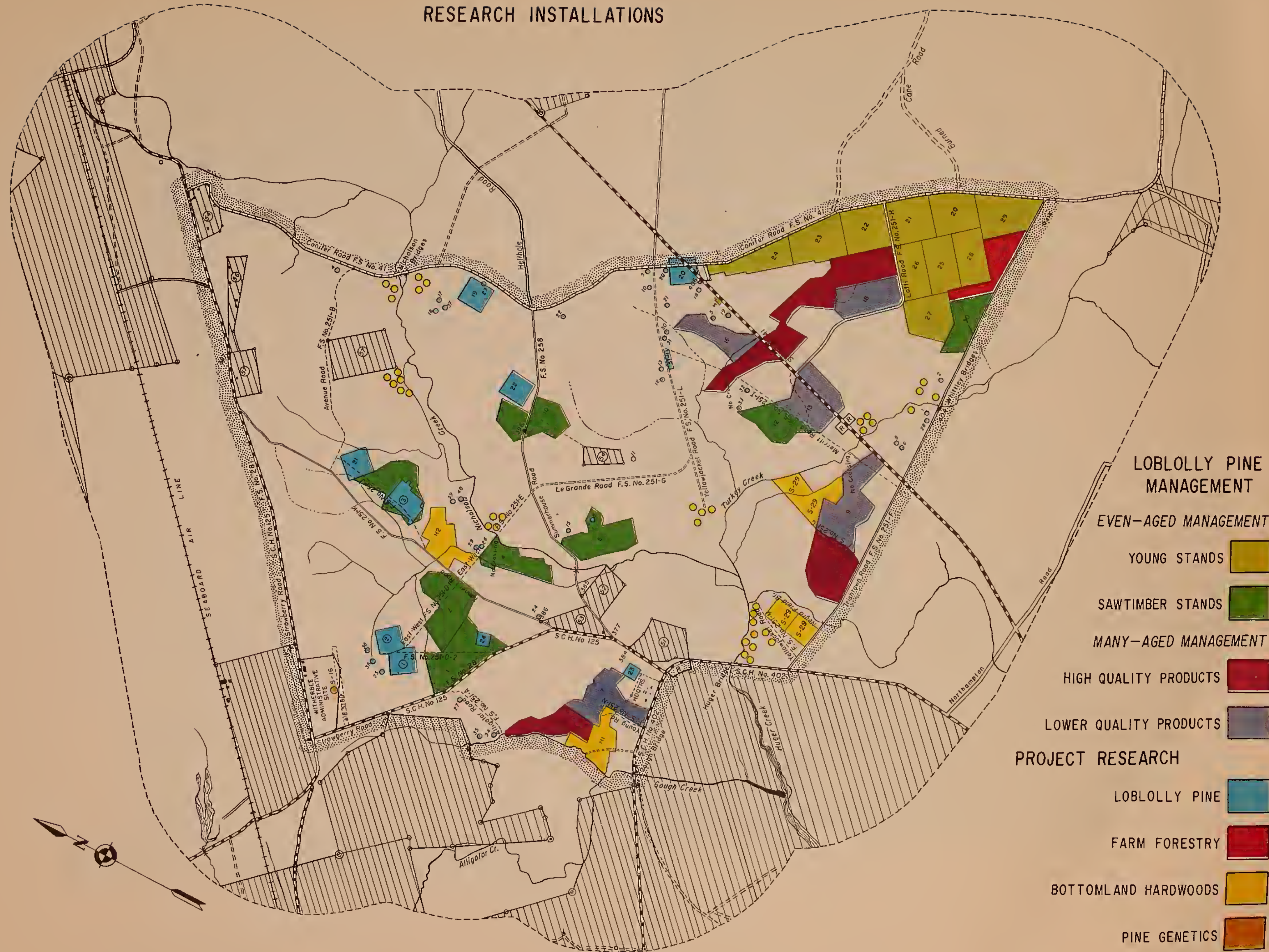


Figure 2. — Research installations within the Santee Experimental Forest, and extent of protection area.

RESEARCH INSTALLATIONS



In addition to reducing fuel and wildfire hazard, prescribed burn kills back the smaller hardwoods.

BASIC CONSIDERATIONS

Past Fires

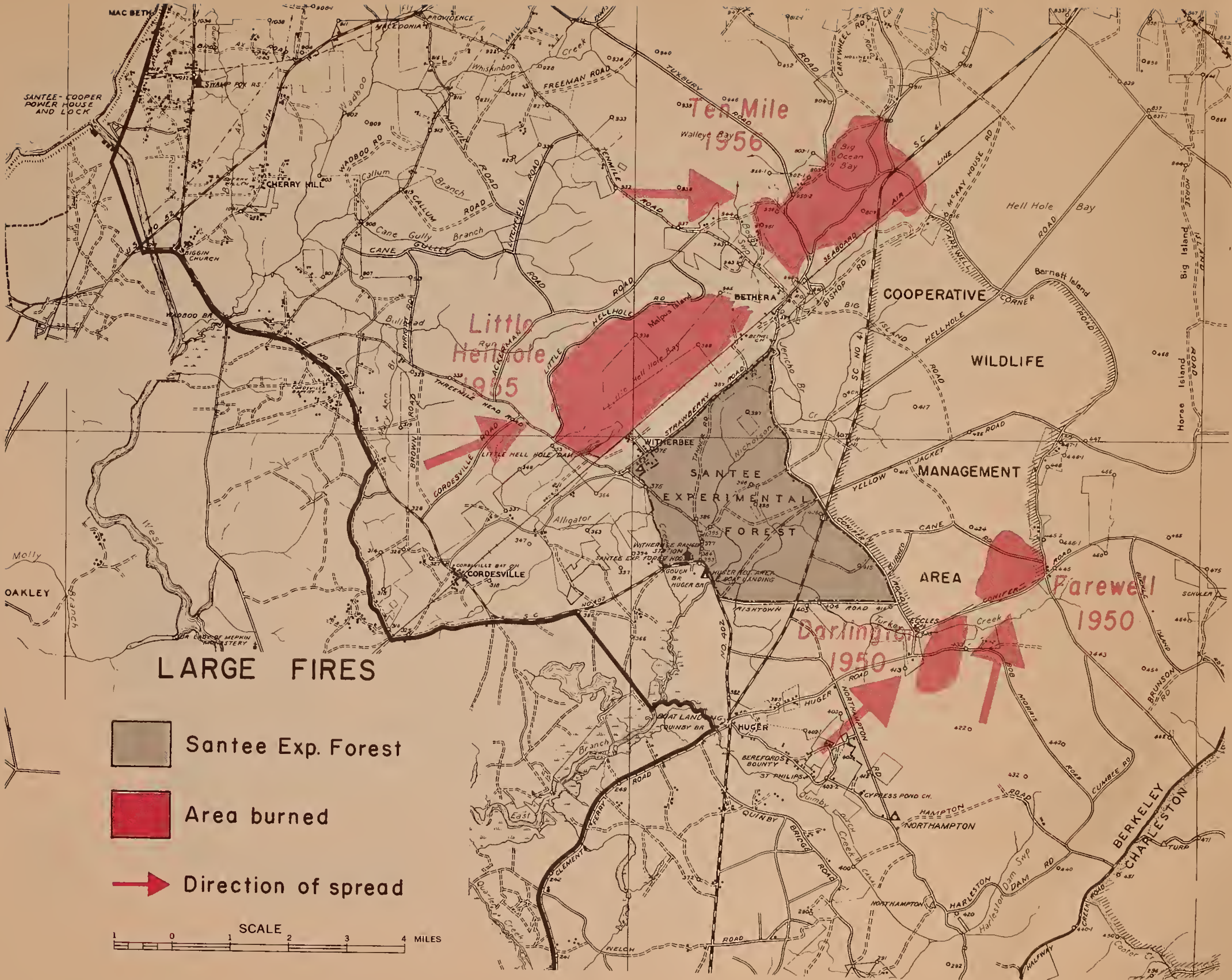
The first step in developing this special fire plan was to chart what the situation is and has been on the Experimental Forest and adjoining Francis Marion National Forest land.

Since 1950, four large fires have threatened the Santee (fig. 3). The Little Hell Hole Fire of 3,400 acres burned to within a half-mile of the Experimental Forest boundary. The other large fires came within 3 miles (Ten-Mile Fire, 2,000 acres; Darlington Fire, 400 acres; and Farewell Corner Fire, 450 acres).

There have also been many dangerous small fires. If we consider a buffer zone 1 mile wide around the Experimental Forest a prime necessity—as it obviously is—78 fires have burned within this area during the past 10 years (fig. 4). Fires by size-class and cause for the 10-year period 1949-1958 are shown in the following tabulation:

Size Class	*Number*	*Percent*
A	17	22
B	47	61
C	12	15
D	1	1
E	1	1
	78	100
Cause		
Incendiary	67	86
Smoker	7	9
Other	4	5
	78	100

Figure 3. — Large fires within 5 miles of Santee Experimental Forest during 10-year period 1949-58.


LARGE FIRES
Santee Exp. Forest
Area burned
Direction of spread
SCALE
1 0 1 2 3 4 MILES
Ten Mile
1956
Little Hellhole
1955
Darlington
1950
Farewell
1950
SANTEE EXPERIMENTAL FOREST
COOPERATIVE WILDLIFE MANAGEMENT AREA
SANTEE-COOPER POWER HOUSE AND LOCK
MAC BETH
PROVIDENCE
MACEDONIA
CHERRY HILL
BIGGIN CHURCH
CORDESVILLE
OAKLEY
WITHERBEE
BETHERA
HUGER
NORTHAMPTON
BEREFORDS BOUNTY
ST PHILIPS
CYPRESS POND CH.
ECCLES
Big Ocean Bay
Hell Hole Bay
Barnett Island
Big Island
Horse Island
Malpus Island
Little Hell Hole Bay
Walleye Bay
Alligator
West Branch
Molly Branch
BERKELEY
CHARLESTON

One of the earliest decisions has been that the 1-mile buffer zone around the perimeter of the Experimental Forest must be established if we are to have adequate protection and means of coping with encroaching large fires. Fuel reduction measures aimed at slowing down large fires need to be carried out within this zone; also an intensification of prevention and suppression efforts to reduce number and size of fires threatening the Santee. This zone will add 11,000 acres, so that when it is included with the forest we have a total of 17,000 acres in what we call *the protection area.*

Three fairly well defined occurrence zones exist. By far the heaviest is in the northeast corner of the protection area, mostly between Strawberry Road and the Seaboard Railroad and probably associated with the people concentrated in and around Bethera, South Carolina. Another area lies just beyond the northeast corner of the Experimental Forest. The third is in the southeastern corner. Because of the concentration of research installations, the latter may well represent the most critical occurrence problem.

Incendiarism stands out as a primary cause of fire in the protection area as elsewhere on the Francis Marion National Forest. According to the records there are no unique aspects of incendiarism associated with the protection area.

August appears to be the only fire-free month (table 1). However, there is a well defined fire season of about 4 months (January to April), during which about 85 percent of the fires occur. March is the peak month, with about half the total fires.

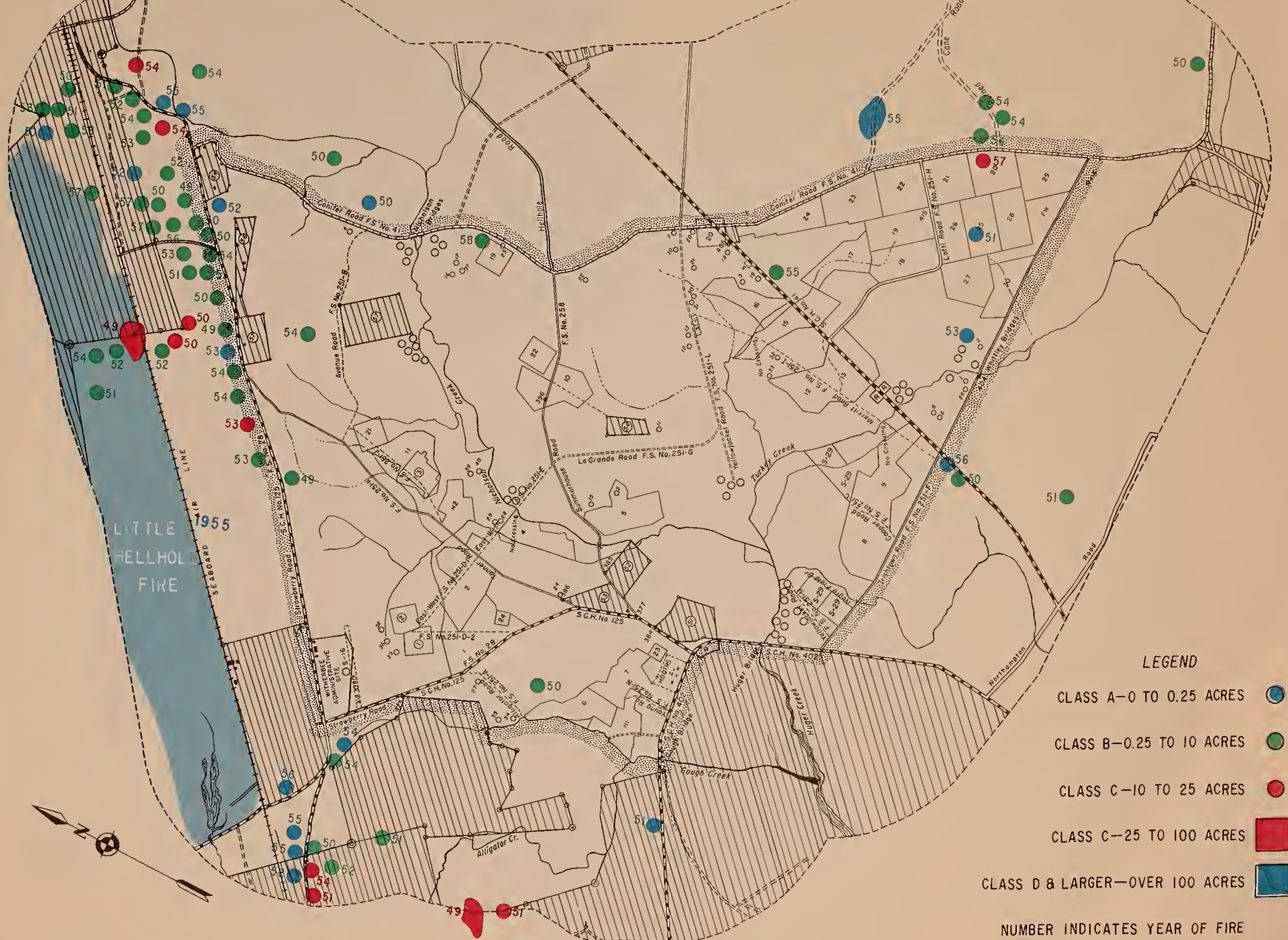
Protection of the Santee Forest depends mainly on the regular fire control organization of the Witherbee Ranger District of the Francis Marion National Forest. The fact that the Witherbee Ranger District is overextended, spread thin, and worn down during periods of extreme fire danger intensifies all the hazards outlined above. There are at least several such periods each year. When they occur, fire control within the Santee may depend entirely on the meager manpower and equipment resources of the research organization.

Table 1.—Fire occurrence by month and year, 10 year period (1949-1958)

Month	1949	1950	1951	1952	1953	1954	1955	1956	1957	1958	Total	
	Number											Percent
January	-	1	-	1	-	2	4	1	-	-	9	12
February	-	4	-	1	-	2	2	1	-	1	11	14
March	4	5	7	2	1	9	-	-	2	-	30	39
April	1	5	2	1	4	-	-	1	1	-	15	19
May	-	-	1	-	-	-	-	-	-	-	1	1
June	-	1	-	-	-	-	-	-	-	-	1	1
July	-	-	-	-	-	1	-	-	-	-	1	1
August	-	-	-	-	-	-	-	-	-	-	-	-
September	-	-	-	-	-	2	-	-	-	-	2	3
October	-	-	1	-	-	-	-	-	-	-	1	1
November	-	-	-	1	1	-	-	-	1	1	4	5
December	-	-	-	-	2	-	-	1	-	-	3	4
Total	5	16	11	6	8	16	6	4	4	2	78	100

Figure 4. — Ten-year fire occurrence (1949-1958) within protection area.

TEN-YEAR FIRE OCCURRENCE 1949–1958



Fuel Types

Continuing the evaluation of the situation, we find that the research program has resulted in extensive plot and compartment areas from which fire must be excluded. In this connection, fire exclusion over much of the Experimental Forest area as a result of past protection has led to a fuel buildup that increases the danger of damaging or uncontrollable fires.

From aerial photos, we find three major types: pine, terrace hardwood, and bottomland hardwood (fig. 5).

Pine fuels (12,030 acres).—These include all of the longleaf and loblolly pine timber types regardless of age class. The fuels associated with these types are the most flammable and dangerous of all in the protection area. Even after a heavy rain, they dry out rapidly and become increasingly flammable as the relative humidity drops. For the most part, the fuel consists of an accumulation of dead pine needles mixed with some herbaceous material and hardwood leaves. Most of it lies on the ground but in areas with heavy understories a considerable amount may be draped on the branches of understory hardwoods and shrubs. On a given area the total volume of fuel may be reduced by prescribed burning. However, measurements made in conjunction with our prescribed burning studies show that these fuels will accumulate at such a rate that we must prescribe burn them about every 3 years for adequate fuel control.

Terrace hardwood fuels (1,407 acres).—These fuels are associated with the mixed hardwood-pine types found along the course of streams. The areas are not subject to overflow during flood periods. Because of a high proportion of hardwood leaves, they do not dry out as rapidly as the previously described pine fuels. For the same reason, they are not as sensitive to changes in relative humidity. Fires generally burn with a lower rate of spread and are easier to control than in pine fuels. On the other hand, prescribed burning for fuel reduction is not usually feasible because of possible damage to the valuable terrace hardwoods. Fortunately, the hardwood leaves tend to decompose rapidly and do not accumulate in heavy volumes as do pine needles. Thus the need for fuel reduction measures is generally not critical.

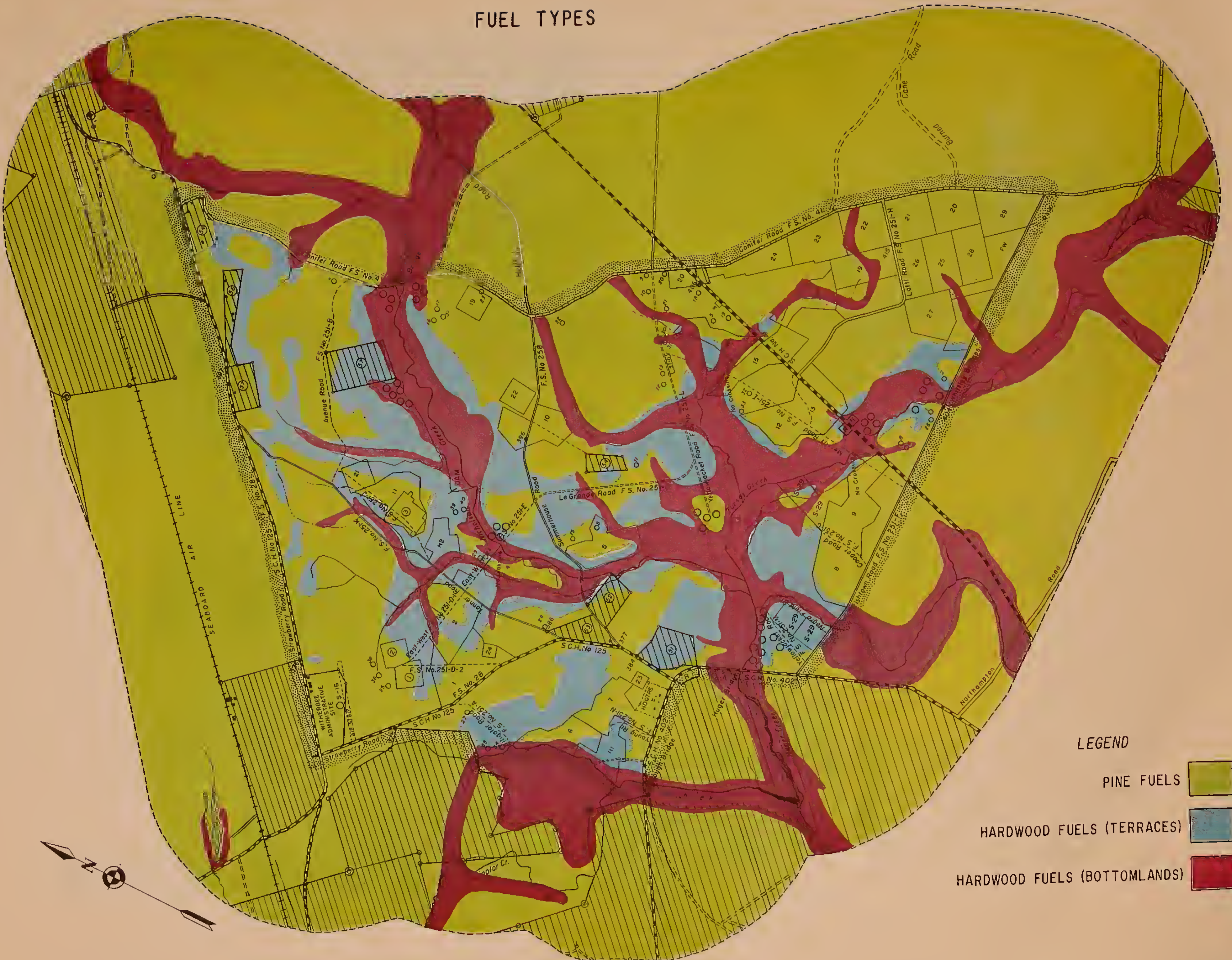
Bottomland hardwood fuels (3,663 acres).—These are the least flammable of the fuels. Here too hardwood leaves comprise most of the fuel. Accumulations are generally sparse and in normal years the sites are generally too wet to carry fire.

"Needle drape" provides a curtain of fuel that can generate sheets of flame.

Fuel buildup is rapid. Prescribed burn is considered necessary every 3 years.

Figure 5. — Fuel types within protection area.

FUEL TYPES


LEGEND
PINE FUELS
HARDWOOD FUELS (TERRACES)
HARDWOOD FUELS (BOTTOMLANDS)
SEABOARD AIR LINE
Conifer Road F.S. No. 41
Le Grande Road F.S. No. 25
Strawberry Road
WITHERBEE ADMINISTRATIVE SITE
Northampton Road
Cane Road
Burned

Fire Detection

On the basis of past performance the Witherbee tower, located in the northwest corner of the Experimental Forest, gives the most service. During the past 10 years, most of the fires detected by towers were from the Witherbee location, with Northampton second best. The more distant Wando, Jamestown, and Gravel Hill towers of the National Forest system each picked up only about 1 percent of total fires between 1949 and 1958, as shown in the following tabulation:

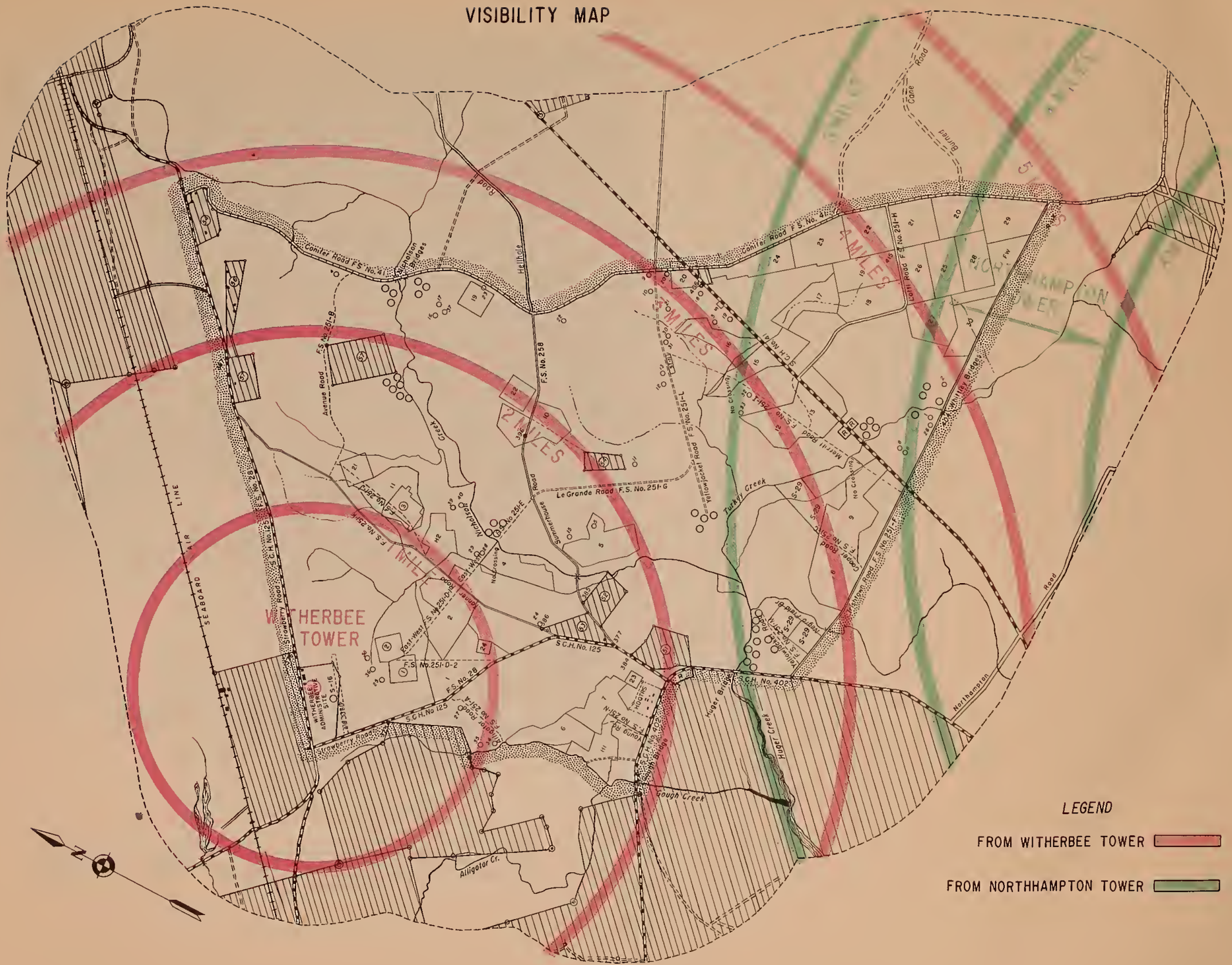
Discovered by	*Percent*
Towers:	
Witherbee	41
Northampton	14
Wando	1
Jamestown	1
Gravel Hill	1
All towers	58
Other:	
Forest Service employees	24
Airplane	1
Other people	17
All other	42
Total	100

It is significant that 42 percent of all fires were detected by sources outside the towers. Most of these were spotted in the early morning hours, usually by people en route to work (including Forest Service employees). Apparently most were small night sets by incendiaries and observed by the aforementioned travellers before the glow or smoke rise was sufficient for detection by lookouts.

Because of the flat terrain there is no problem of unseen area from either the Witherbee or Northampton towers. Visibility as affected by smoke or haze is the chief limiting factor to ready detection from either tower. For example, the problem becomes serious when visibility drops below 4 miles (fig. 6). For all practical purposes the Experimental Forest is out of range from the Northampton tower at that time; neither can the southeast corner, an area of concentrated research values, be seen from Witherbee. Actually about 10 percent of the research installations are outside the range of towers when visibility drops to 4 miles. This jumps up to more than half of the research areas when the visibility drops to 3 miles. Most of the nonvisible area is concentrated in the southeast corner of the Experimental Forest.

Figure 6. — Coverage from Witherbee and Northampton towers for various visibility distances.

VISIBILITY MAP



Road System and Travel Time

A reasonably good road system serves the protection area. Both Forest Service and South Carolina State Highway Department roads are involved for an aggregate of 37 miles. Fourteen miles are paved, 16 miles can be classed as good dirt roads, and 7 miles as fair dirt roads. There exists a small additional mileage of seasonal woods roads. The paved roads were designed primarily to meet the needs of the travelling public and are all in the State Highway system. Practically all the other roads follow routes of travel established long before the Francis Marion National Forest came into being; many have since been improved with a view to National Forest protection.

Most suppression action has originated and will originate from the Witherbee Ranger Station, with supplemental action as needed from the Santee Experimental Forest headquarters. A travel time study showed that any point on the Experimental Forest can be reached within 27 minutes from Witherbee or the Santee locations (figures 7 and 8). This is based on the transport of a tractor-plow unit over roads and land as needed to reach a going fire anywhere on the Experimental Forest.

From the Witherbee Ranger Station the poorest coverage involves the critical southeast corner of the Experimental Forest. Most seriously affected are about 500 acres (37 percent) of research installation to which travel time would exceed 21 minutes from Witherbee. This suggests some additions to the road system as a means of reducing travel time from that point.

Live-oak avenue and Spanish moss at the entrance to the Santee.

Figure 7. — Travel time coverage of Santee Experimental Forest from Witherbee Administrative site.

TRAVEL TIME FROM WITHERBEE

LEGEND

- 0 — 3 MINUTES
- 3 — 6 MINUTES
- 6 — 9 MINUTES
- 9 — 12 MINUTES
- 12 — 15 MINUTES
- 15 — 18 MINUTES
- 18 — 21 MINUTES
- 21 — 24 MINUTES
- 24 — 27 MINUTES

Group of foresters at a fish fry on the Huger Recreation Area.

Figure 8. — Travel time coverage of Santee Experimental Forest from Santee Administrative site.


TRAVEL TIME FROM SANTEE EXPERIMENTAL FOREST HEADQUARTERS
LEGEND
0 — 3 MINUTES
3 — 6 MINUTES
6 — 9 MINUTES
9 — 12 MINUTES
12 — 15 MINUTES
15 — 18 MINUTES
18 — 21 MINUTES
21 — 24 MINUTES
24 — 27 MINUTES
SEABOARD AIR LINE
Conifer Road F.S. No. 41
Nicholson Bridges
Hellhole
Road
Cane Road
Burned
Avenue Road
F.S. No. 251-B
F.S. No. 258
DAM
LeGrande Road F.S. No. 251-G
Turkey Creek
No Crossing
Whitley Bridges
Northampton
Road
S.C.H. No. 125
S.C.H. No. 402
Strawberry Road
ADMINISTRATIVE SITE
F.S. No. 251-D-2
Huger Bridge
Huger Creek
Gough Creek
Alligator Cr.

Recreation and Other Uses

Any fire protection plan for the Experimental Forest should give full consideration to problems arising from other uses of the forest. In previous years, the area was subject to considerable grazing use, but since open range is no longer legal, it is expected that incendiarism intended for range improvement will greatly diminish. On the other hand, there is an increasing use of the forest by people seeking recreation (fig. 9). For the most part this is associated with hunting or fishing. The long seasons (deer, August 15-January 1; small game, September 1-March 1; and fishing, April 1-October 15) bring some users into the forest during every month of the year except March. There is also considerable picnicking and some camping. Much of this is associated with the hunting and fishing, especially during the spring and fall seasons.

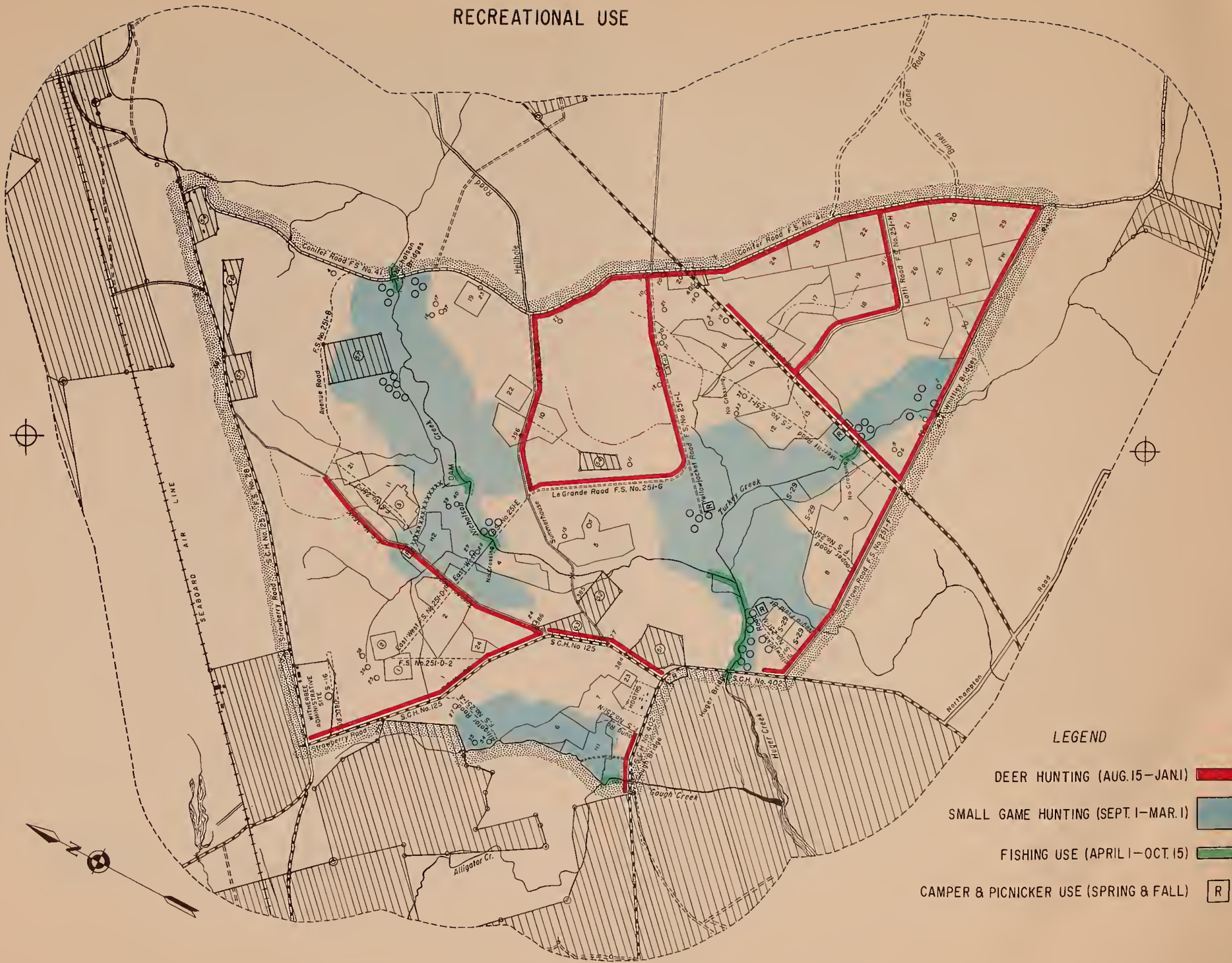
Concentrations occur on weekends and holidays and during the summer on Wednesdays, which are half-holidays for many people. Deer hunters, a source of smoker fires, are special hazards along roads. Deer are driven by dogs, and the hunters take stands along certain roads. Small-game hunters, a possible source of camper and smoker fires, generally seek squirrels and birds in the bottomlands along the streams. Fishermen create the same hazards as small game hunters but are considerably more localized.

With an ever increasing pressure on public land for recreational use, it appears undesirable to close any part of the Experimental Forest to such use. Administrators may not agree on this point. Our view is that we must improve recreational facilities, create favorable attitudes, and make friends and allies of the people who use these lands—rather than generating hostility by exclusion.

Long seasons of hunting and fishing bring heavy use.

Figure 9. — Recreational use of Santee Experimental Forest.

RECREATIONAL USE



THE SPECIAL FIRE PLAN

The plan assumes that the Santee Experimental Forest will continue to be handled as part of the adjacent Witherbee Ranger District for general fire protection purposes. The central fire dispatcher for the Francis Marion Forest is at the Witherbee headquarters. Here also are located the heavy suppression units (tractors and plows), the main fire tool cache for the District, and a fire danger station. The dispatcher receives fire weather forccasts and special weather predictions from the U. S. Weather Bureau. The Witherbee Ranger will include the Experimental Forest in his unit fire plans, and, recognizing the values and dangers involved, he will give normal protection to the Santee insofar as funds allow. This, however, does not adequately provide for continued intensive protection of the Experimental Forest during recurring critical periods. Nor does it establish the means for adequately coping with the problem of holding back or reducing the impact of future large fires threatening the Santee; hence, the urgent need for a supplemental protection effort which this plan provides.

The elements of the plan include a system of protection priorities for specific research areas, fuel control, supplemental detection, presuppression standby re-enforcements, communication equipment, suppression equipment, fire prevention action, and roads needed to attain the desired level of protection.

Protection Priorities

It is obviously impossible to give complete protection to everything. Often enough one hears it said, "Wildfire cannot be tolerated on any part of the Experimental Forest," but how can such a prohibition be guaranteed? The answer is, it can't. Thus, in an effort to be realistic we have been forced to decide where fire will hurt us the most, where moderately, where least (fig. 10).

First priority (984 acres).—Here every available force will be mobilized to exclude wildfire. The basic premise is that any unscheduled burning would entirely confound or seriously modify research results. Typical areas are growing space studies, methods of cutting, regeneration study plots, all genetic studies, and any management unit where fire exclusion is an assigned treatment. Also included in this category are the Experimental Forest administrative site, with its buildings, research records, and much valuable equipment; and, strange as it may seem, an area of concentrated prescribed burning tests. These prescribed burns are among the oldest formalized burning experiments in the country and if hit by any unscheduled fire, the entire study could be confounded.

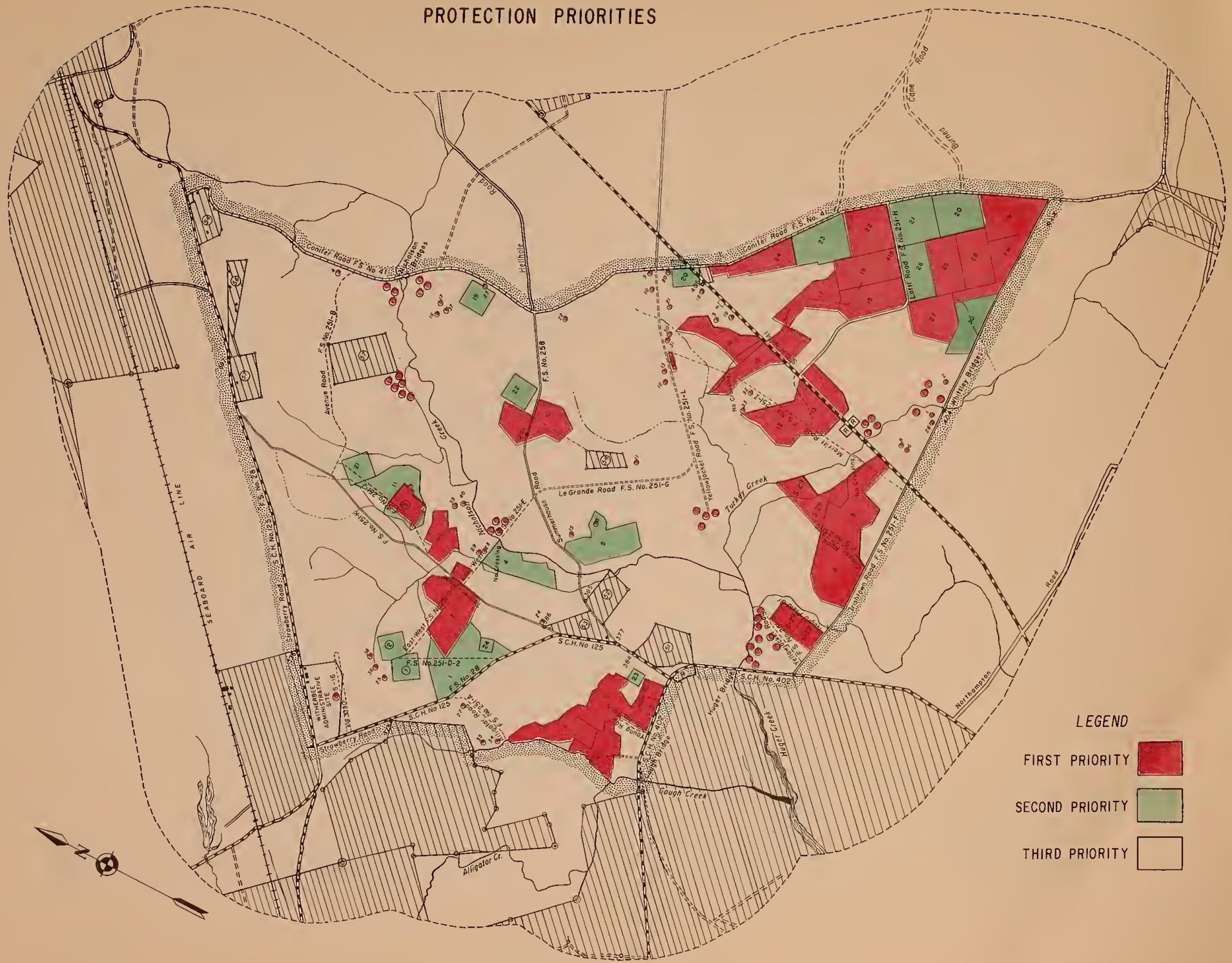
Second priority (380 acres).—A Class A fire can be accepted in this classification. The ¼-acre size limit is set mainly as a guide to intensity of suppression effort. In some cases an acre or so of burned area would probably not cause any marked change in research results. For example, most of the classified areas are management units in which prescribed fire is included in the silvicultural program; a light burn from small wildfires would do no great harm here, especially if set under conditions suitable for prescribed burning. However, in critical fire weather, severe damage to the research installation would probably result from almost any wildfire. Other areas included in the category are the farm woodlot demonstration area and older plots and experimental blocks having an ecological or historical value.

Third priority (15,736 acres).—Here within the Experimental Forest and in the entire buffer area, we should strive to hold individual wildfires to Class B, or less than 10 acres in size. In all cases timber values would be directly involved. But the important consideration is that any wildfire is a threat to the research investment—some more than others, depending on their location in relation to experimental areas.

Thirteen fires in the last ten years have exceeded the sizes allowed by these three protection priorities, the two in the Experimental Forest fortunately doing no serious damage. Three in the buffer zone were critical—a 1955 burn of about 300 acres, and two in 1949 of approximately 100 acres each.

Figure 10. — Protection priorities within protection area.

PROTECTION PRIORITIES



Fuel Control

This is primarily a program of prescribed burning, firebreak construction, and maintenance. However, it is our main defense against a big fire and severe damage from all fires within the protection area. The prescribed burning is largely confined to the pine fuels. About 1,920 acres will be treated annually on a 3-year cycle. The burning does not eliminate all combustible material from treated areas but does a good job of keeping down accumulations of flash fuel such as the needle fall of recent years and needle drape.

Firebreak construction aims to combine cleared and disked lanes with prescribed burned strips. For example, cleared and disked lanes generally will be established along main travel routes about 2 chains back from the ditch line. Annually the lanes will be maintained with a disk-harrow and the intervening strip burned out to the road. In a few cases, some wider areas will be burned, as shown in figure 11. For the most part, these are strips of woodland lying between a main road and some of the areas in the total fire exclusion priority class.

Supplementing the burned firebreaks will be some which are cleared and disked only. These are generally interior breaks involving total exclusion areas around which the wider burned firebreaks are not feasible.

Two *First Priority* areas will require firebreaks also. They are the Experimental Forest headquarters site and a prescribed burning study block, each designated on figure 11 by a red arrow. At the administrative site a plowed and burned strip around three sides should be sufficient to support protective measures in effect, which include strategically located fire hydrants and a fire-resistant storage vault for research records. Because the wider breaks are hardly feasible in the second area, a heavy network of interior cleared and plowed lanes is planned, in addition to fire prevention measures described in the following section.

Initial cost of the total fuel control program will be $5,075, and annual maintenance $1,861 (table 2).

Table 2.—Fuel control costs

Item	Quantity	Costs	
		Initial	Annual
Firebreak construction:			
Clearing 8-foot lane	36 miles	$3,600	--
Initial plowing	36 miles	900	--
Annual disking	36 miles	--	$600
Annual burning	27 miles	575	300
Fire line costs		$5,075	$900
Prescribed burning:			
Experimental Forest areas (3 year cycle)	655 acres	--	$328
Francis Marion National Forest 1 mile buffer area (3 year cycle)	1,265 acres 1/	--	633
Prescribed burning cost		--	$961
All costs		$5,075	$1,861

1/ Increase in area burned annually caused by shifting from present 5-year to 3-year burning cycle.

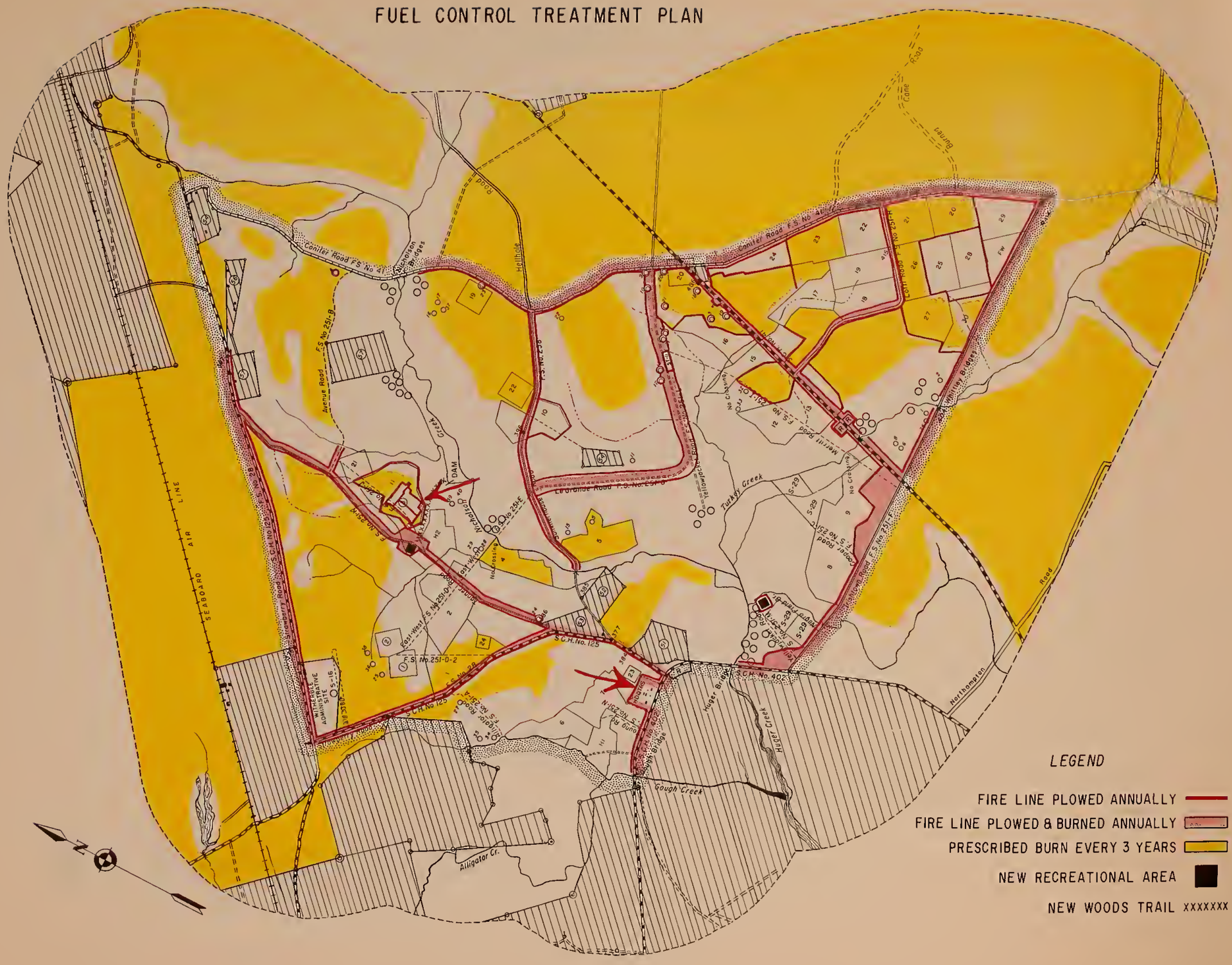
Fire Prevention

Since we cannot bar the public, and recreational use increases each year, we must channel this use away from our most valuable research installations. In the past, campers, picnickers, hunters, and fishermen have regularly parked their cars and built their fires in and near some of our most valuable study areas.

To control this indiscriminate parking, picnicking, and camping means adding two more recreational developments with appropriate facilities to the present Huger picnic ground and Beech Hill Wayside area (fig. 11). One is in the southeast corner of the forest and takes care of a large number of fishermen and hunters who drive up Forest Service road No. 251M to Nicholson and Turkey Creeks. The second area lies along Forest Service road No. 251K near the high priority fire exclusion area. A woods road leads into the exclusion area from Forest Service road No. 251K and is subject to heavy use by hunters and fishermen intending to reach the Nicholson Creek bottomland. Some camping is also done here and has resulted in at least one wildfire which burned up to the edge of the exclusion area. The plan is to close the woods road and build a parking, camping and picnicking area on west side of Forest Service road No. 251K. In addition, a trail leading away from the exclusion area but into the Nicholson Creek bottom is needed.

Figure 11. — Fuel control treatment plan for entire protection area.

FUEL CONTROL TREATMENT PLAN



On weekends and holidays occurring on Class 3 or worse fire days during hunting and fishing season, there is need for patrol action to check for accidental fires on areas of highest use. Patrolmen will also caution all users. A total effort amounting to about 10 man days per year is indicated here. Total cost will be, initial $2,050, annual $515 (table 3).

Table 3.—Fire prevention costs

Item	Quantity	Costs	
		Initial	Annual
Development of fireproof concentration points for hunters, fishermen, campers, and other users:			
Parking, camping, and sanitary facilities	2 areas	$2,000	$400
Foot trail	35 chains	50	25
Patrol action on holidays and other high-use days	10 each	--	90
All prevention		$2,050	$515

Supplemental Detection

Present manning schedules for the Witherbee and Northampton towers are considered adequate. The most critical need for supplemental detection develops on days of low visibility. As previously pointed out, the southeast portion of the Experimental Forest becomes extremely vulnerable when visibility drops below 4 miles. The plan is to establish a patrol in the area east of South Carolina highway 41 on all days above Class 3 fire danger when visibility falls below 4 miles and to expand these activities to additional areas as needed. On special occasions, Class 5 days or days of indicated erratic fire behavior, patrol action will also be in order for all high priority areas, especially in the three heavier occurrence zones previously described. It is estimated that this will require 21 days of patrol action per year, costing $190.

Presuppression Standby

Supplemental standby of suppression personnel is largely needed on certain weekends during the fire season. Fire occurrence is generally heaviest on Saturdays and Sundays. Hence, the frequently mentioned "critical" days for the regular fire control organization largely occur on weekends of high fire danger or erratic fire behavior. Based on group experience, supplemental personnel for suppression action on the Experimental Forest protection area will require 3 men for an equivalent of 5 weekends ($490), and 1 man for 7 weekends ($125). This is assumed to provide also for emergency periods outside of weekends.

Communications

Telephone communication facilities between the Witherbee and the Santee headquarters and to the outside are adequate. Some supplemental radio equipment is needed, however. An early change-over in type and frequency of the National Forest radio equipment is contemplated. This will result in making obsolete the present mobile equipment on the Experimental Forest. One unit in the Forest Superintendent's work vehicle will need to be replaced. In addition, there is need to equip another vehicle used regularly by Experimental Forest personnel subject to fire call from any location within the protection area. The two new mobile radios (160 megacycle receivers and transmitters) will cost $700 and need about $100 of annual maintenance.

Fire Equipment

The supply of small hand tools for fire fighting is considered adequate to meet the needs of an intensified protection program. Their main use is for mopup. Our most urgent need is for heavy suppression equipment. The limited number of conventional heavy equipment units (TD-9 crawler tractor, Mathis plow, and tandem truck) means that they must be used on any fire occurring within the Witherbee Ranger District. Thus, there are frequent occasions when these units are heavily engaged in distant parts of the National Forest and not readily available for initial attack on Experimental Forest fires. This situation, coupled with the

Figure 12. — Travel time coverage from Witherbee Administrative site with added roads.

TRAVEL TIME FROM WITHERBEE
INCLUDING PROPOSED ROADS

LEGEND

- 0 — 3 MINUTES
- 3 — 6 MINUTES
- 6 — 9 MINUTES
- 9 — 12 MINUTES
- 12 — 15 MINUTES
- 15 — 18 MINUTES
- 18 — 21 MINUTES
- 21 — 24 MINUTES
- 24 — 27 MINUTES

planned heavy schedule of prescribed burning and firebreak construction and maintenance, establishes a need for one heavy unit primarily assigned to the Experimental Forest protection area. Cost of a fully-equipped unit is shown in the tabulation.

Equipment	*Estimated Cost* *Initial*	*Annual*
Crawler tractor (TD-9 or equivalent)	$7,500	
Mathis plow	1,100	
Tandem truck (2 ton or larger)	5,000	$3,460
Firebreak disk-harrow	1,000	
Miscellaneous equipment	500	
	$15,100	$3,460

Roads

The National Forest Transportation Development Plan includes 20.3 miles of Experimental Forest roads. Of this amount 8.2 miles have been constructed to a satisfactory standard. As pointed out earlier, there is need to shorten travel time from Witherbee for fire suppression, especially to the more distant portion of the Experimental Forest (table 4). To this end, there are about 2.7 miles of new road construction (including bridges) and 4.7 miles of betterment which should be earmarked for early programming (fig. 12). Total cost of building needed roads is $90,000, with $1,480 annual maintenance (table 5).

Table 4.—Travel time coverage from Witherbee Ranger Station and Santee Experimental Forest Headquarters

Travel time (Minutes)	From Santee Experimental Forest Headquarters	From Witherbee Ranger Station	
		With present roads	With additional roads
	Percent of Experimental Forest area covered		
3	2	2	3
6	9	9	14
9	22	20	28
12	40	33	44
15	64	44	61
18	86	62	79
21	97	80	92
24	99	94	99
27	100	100	100

Table 5.—Road construction and improvement needed to shorten travel time from Witherbee Ranger Station

Road No.	Total needed	Adequate condition	Inadequate condition	New construction needed	Estimated cost to complete
	Miles				Dollars
251 D	1.8	--	1.1	0.7	10,000
251 E	0.6	--	0.6	--	22,000
251 G	1.0	--	1.0	--	9,000
251 P	0.8	--	--	0.8	9,000
251 H	1.6	1.3	--	0.3	6,000
251 A	1.3	--	0.7	0.6	16,000
251 B	1.6	--	1.3	0.3	18,000
All roads 1/	8.7	1.3	4.7	2.7	90,000

1/ Annual maintenance estimated at $200 per mile (8.7 - 1.3) = 7.4 miles at $200, or $1,480.

Total Cost of Special Plan

Regular funds available for protection of the Santee Experimental Forest do not provide for adequate protection of the research investment. A searching analysis of the various elements of the protection job, including fuel control, fire prevention, detection, presuppression standby, communications, equipment, and roads, shows that we need additional funds of $112,925 to cover initial expense, and $8,221 annually to do the job (table 6).

Table 6.—Summary of costs for special fire plan

Item	Estimated cost	
	Initial	Annual
	Dollars	
Fuel control	5,075	1,861
Fire prevention	2,050	515
Detection	--	190
Presuppression	--	615
Communication equipment	700	100
Other new equipment	15,100	3,460
Roads	90,000	1,480
Total	112,925	8,221